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SPACING COTTON ON NORTH CAROLINA SOILS

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By W. F. Pate and R. Y. Winters, *Division of Agronomy*

On account of the scarcity of farm labor and the high cost of farming implements and fertilizers used in growing crops, and changes proposed that will insure greater acreage yields or lower the cost of production will be very acceptable to farmers at this time.

It has always been recognized that to secure maximum yields per acre from any crop a perfect stand should be secured. With cotton, the question of spacing has been studied by many experiment stations in the Southern States for a long time. Some stations after carrying on the work for a number of years with different varieties of cotton and under varying climatic, soil and fertilizer conditions, discontinued the experiments after securing data enough that was thought sufficient to draw definite conclusions. Other stations are still working on the problem and are securing results which seem to justify the conclusion that the problem is still undecided.

HABIT OF GROWTH

Among the numerous varieties of cotton one finds a considerable variation in habit of growth. The plants of some varieties, such as King, Simpkins, and Ricks, are small and early maturing. Plants of these varieties would naturally require less space than the larger plants grown from Mexican Big Boll, Lone Star, and Russell's Big Boll. A few of the varieties like Jackson Limbless, Willett's Red Leaf, and some strains of Cook are upright in growth and have very short lateral branches. These varieties bear their fruit close to the main stem. Other varieties, like Mexican Big Boll and Lone Star, have long spreading branches and distribute their fruit over the whole plant.

On some of our heavier soils in the eastern part of the state there is a tendency for cotton to make too much growth, the plants often overlapping in the rows. Such dense growth shades the bolls and prevents the free circulation of air. During wet seasons these fields suffer considerable loss from boll rot and discolored cotton. In Craven County of this state, Mr. J. E. Daugherty has remedied this by planting cotton in six-foot rows and later planting a row of peanuts in between. The broad space allows full circulation of air and gives room for the entrance of sunshine. By this method a better grade of cotton is produced and the income per acre has been almost as great as when the cotton was planted in four-foot rows.

Thicker planting (one stalk every twelve to sixteen inches) would reduce the growth of lateral branches and make it possible to get good results in narrower rows. With the short staple cottons the thick planting

would be more profitable than the broad spacing between rows and would have the other advantage of giving access to sunshine and air circulation. The closer spacing should be particularly profitable in sections where cotton makes a very large growth and where it is difficult to mature even the early varieties; for the closer spacing not only reduces the vegetative growth but hastens maturity. This would be especially desirable under boll-weevil conditions where early maturity is one of the main factors.

Cotton seed that has been allowed to mix at the gin or in the fields and has not been selected for high yield will have a larger percentage of unproductive plants. Plants from such seeds will give a poor yield under any planting system, for no method of spacing will make a productive plant from one that has inherited low yielding qualities. Let's overcome this loss by saving good seed from high producing stalks this fall.

RESULTS FROM SPACING TESTS OF COTTON IN DIFFERENT SECTIONS OF THE STATE

Iredell Test Farm

The Iredell Test Farm is located at Statesville near the western limit of the cotton growing area of the state. The soil at this farm represents the Cecil series of the Piedmont section. On account of the short growing season at this farm, King's Improved cotton was used for planting the distance test. The rows were prepared in three and a third, and four foot widths, and the seed was planted in the regular way with a cotton planter. At the time of chopping the plants were thinned to four different distances, twelve, sixteen, twenty and twenty-four inches. The following table contains the results of six tests on this farm:

TABLE I—DISTANCE TEST OF COTTON—IREDELL TEST FARM.

Years Tested	Yield of Seed Cotton in Pounds per Acre at Different Distancing							
	3⅓ Ft. by 12 In.	3⅓ Ft. by 16 In.	3⅓ Ft. by 20 In.	3⅓ Ft. by 24 In.	4 Ft. by 12 In.	4 Ft. by 16 In.	4 Ft. by 20 In.	4 Ft. by 24 In.
First	743.2	743.2	630.6	750.8	612.5	675.0	862.5	791.7
Second	845.0	795.0	810.0	835.0	845.8	812.5	779.2	762.5
Third	975.0	1100.0	1035.0	1110.0	1340.0	1280.0	1170.0	1325.0
Fourth	1190.0	1785.0	1585.0	1280.0	1215.3	937.5	720.5	612.0
Fifth	880.0	980.0	875.0	1030.0	1093.1	853.9	635.3	759.0
Sixth	1345.0	1540.0	1510.0	1515.0	1498.2	1472.8	1485.7	1249.2
Averages	996.3	1157.2	1077.9	1086.8	1100.8	1005.2	942.2	916.5

During the six years' test on this farm the three and a third foot rows with sixteen inches between hills has given the greatest yield of seed cotton per acre. The sixteen inch distance between hills outyielded the twelve inch spacing in every year except two, and in one of these

the yields were the same. The four-foot rows with twelve inches between hills came second with an average yield of 56.4 pounds less of seed cotton per acre.

Experiment Station Farm

The Station Farm is located about two miles west of Raleigh, and the soil represents the sandy clay loam of the Piedmont section. The growing season at this farm is from two to three weeks longer than that at Statesville. In these comparisons the rows were 39.6 and 49.5 inches apart. The plantings were made with King's Improved cotton and later thinned to twelve, sixteen, twenty and twenty-four inches between hills. The table below contains the results of a five years' test with these spacings.

TABLE II—DISTANCE TEST OF COTTON—EXPERIMENT STATION FARM

Year	Yield of Seed Cotton in Pounds per Acre at Different Distancing							
	39.6 In. by 12 In.	39.6 In. by 16 In.	39.6 In. by 20 In.	39.6 In. by 24 In.	49.5 In. by 12 In.	49.5 In. by 16 In.	49.5 In. by 20 In.	49.5 In. by 24 In.
First	1118.8	1107.6	667.2	684.0	1061.6	956.4	612.4	635.2
Second	866.4	827.6	731.6	932.4	826.4	832.8	747.6	828.8
Third	914.4	774.2	970.6	894.4	871.2	867.0	986.8	948.8
Fourth	1318.2	1262.0	1247.4	1118.8	1120.2	1167.6	1173.2	998.8
Fifth	1042.6	950.0	1045.0	917.6	877.5	870.0	865.0	672.5
Averages	1052.1	984.3	932.4	909.4	951.4	938.8	877.0	816.8

In this series of tests, the highest yield came from the closest planting. In every test the narrow rows yielded best and the average yield from twelve inch spacing was considerably better than that of the wider spacings in the rows. This test is being continued to determine the effect of spacings closer than twelve inches. The data at hand indicates that cotton growers of this section should leave the short staple cottons closer in the row than has been the custom in previous years.

Edgecombe Test Farm

The Edgecombe Test Farm is located in the central part of the Coastal Plain section of the state. The soil is representative of much of this section of the state, and consists of a dark gray sandy to fine sandy loam, eight to twelve inches deep, underlain by a yellow sandy to clay subsoil. It classifies as Norfolk sandy loam to fine sandy loam.

This test consisted of eight plats. On four plats the cotton rows were three and one-half feet apart and on the other four plats the rows were four feet apart. The cotton spacing was twelve inches, sixteen inches, twenty inches and twenty-four inches for both the three and one-half and four foot rows.

TABLE III—DISTANCE TEST OF COTTON—EDGECOMBE TEST FARM.

Year	Yield of Seed Cotton in Pounds per Acre at Different Distancing							
	3½ Ft. by 12 In.	3½ Ft. by 16 In.	3½ Ft. by 20 In.	3½ Ft. by 24 In.	4 Ft. by 12 In.	4 Ft. by 16 In.	4 Ft. by 20 In.	4 Ft. by 24 In.
First	1286.0	1384.0	1410.0	1063.0	964.0	----------	893.0	----------
Second	1507.1	1507.1	1342.9	1342.9	1506.3	1331.1	1306.3	1312
Third	1541.2	1751.9	1632.4	1746.0	1723.3	1828.9	1646.6	1861
Fourth	1593.8	1457.7	1214.2	1683.4	1896.7	2019.1	1577.1	1493
Averages	1482.0	1525.1	1399.9	1458.8	1522.6	----------	1355.8	----------

This test was run for four years with Russell's Big Boll cotton. Th best average yield was secured with three and one-half foot rows and si teen inch spacing. With four foot rows, twelve inch spacing gave th greatest amount of cotton. An average of the last three years shows th sixteen inch spacing gives best results with both three and one-half an four foot rows, and that four foot rows give larger returns than the thre and one-half foot rows.

Red Springs Farm

The Red Springs Farm is located in the southern part of the coast Plain section of the state. The soil is a coarse sand with a sandy cla subsoil from twelve to fifteen inches below the surface. The tests wer laid out as were those at the Edgecombe Farm.

TABLE IV—DISTANCE TEST OF COTTON—RED SPRINGS FARM.

Year	Yield of Seed Cotton in Pounds per Acre at Different Distancing							
	3½ Ft. by 12 In.	3½ Ft. by 16 In.	3½ Ft. by 20 In.	3½ Ft. by 24 In.	4 Ft. by 12 In.	4 Ft. by 16 In.	4 Ft. by 20 In.	4 Ft. by 24 In.
First	284.0	288.0	359.0	447.8	566.9	634.7	----------	----------
Second	1258.6	1310.3	1340.5	1428.9	1229.3	1153.2	1051.4	1165
Third	831.8	897.2	906.5	757.0	883.1	997.6	842.2	727
Fourth	857.5	750.0	675.0	860.0	767.5	815.0	727.5	622
Averages	808.0	811.4	820.3	873.4	861.7	900.1	----------	----------

Four years' results have been secured at this farm on six differen distances and three years' results on eight different distances. On a average more seed cotton was harvested from three and one-half foo rows when the distance was twenty-four inches, and with four foot row sixteen inch spacing gave the most cotton. The average yields do no show any very great differences from the different spacing.

Taking all the tests into consideration, the best yields have bee secured from three and one-half foot rows with sixteen inches betwee hills, except at the Experiment Station Farm where three and one-hal foot rows with twelve inch spacing between hills has given best result

SOME ADVANTAGES AND DISADVANTAGES OF CLOSER SPACING

Since the yield depends within certain limits upon the number of producing plants per acre, closer spacing may be profitable. Closer spacing reduces vegetative growth and hastens maturity. In parts of this state this is a very important factor. Under boll weevil conditions this would be important for the whole state.

With the use of narrow rows less effort would be made to seed small grain and other cover crops in the cotton. In spells of abnormally wet weather, the closer spaced cotton would be more difficult to keep free from grass. Closely spaced cotton would be more favorable to the spreading of diseases. Closer spacing of long staple cottons will shorten the staple.

THE FARMER SHOULD MAKE TESTS

There is probably no doubt but that all the different operations required in the growing of crops could be improved upon to the advantage of the farmer. As soil, climatic and other conditions vary in different localities, the best distance to space cotton may also vary. Each farmer for his own conditions can determine this point for himself with the loss of very little time and not very much greater expense. A few rows left unchopped and a few rows spaced at different distances should give him the desired information under his conditions. "Be not the first by whom the new is tried, nor the last to lay the old aside," is as true today as ever.

SUMMARY OF RESULTS FROM SPACING TESTS IN NORTH CAROLINA

Spacing tests of cotton were conducted at the Iredell Test Farm, near Statesville, for six years; at the Experiment Station Farm, near Raleigh, for five years; at the Edgecombe Farm, near Rocky Mount, for four years; and at the Red Springs Farm for four years. In these tests the rows were laid off three and one-half and four feet apart. The seed was planted in the ordinary way with a planter and at the time of chopping the plants were thinned four different spaces, twelve, sixteen, twenty, and twenty-four inches in the row. Taking all the tests into consideration, the best yields have been secured from three and one-half foot rows with sixteen inches between hills, except at the Experiment Station Farm where three and one-half foot rows with twelve inches between hills have given best results.